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SPIONIDAE (POLYCHAETA: ANNELIDA) FROM HAWAII, WITH DESCRIPTIONS OF FIVE NEW SPECIES

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Abstract.—Five new species of spionid polychaetes from Oahu, Hawaii are described: *Australospio mokapu, Laonice papillibranchiae, Polydora kaneohe, Polydora pilikia,* and *Pygospio muscularis.* Ecological data and known distribution around the island of Oahu are included. A table summarizing the major morphological characteristics of the species of *Pygospio* is provided, as well as a list of the 29 known species of spionids from Hawaii, including information on their habitats in Hawaiian waters and their zoogeographical distribution.

Introduction

Examination of polychaetous annelids collected from the intertidal and subtidal waters of Oahu, Hawaii between 1975 and 1980 has yielded five new species of Spionidae described herein. Ecological information and known distribution around the island is provided. Abbott (1946) was the first to record a spionid species from Oahu. Since then Hartman (1966) reviewed the Hawaiian polychaetes and reported only two species of spionids: *Polydora websteri* and *Pseudopolydora antennata.* Additional spionids have been reported in the literature, particularly in reports on environmental surveys, but in many cases specimens were only identified to genus and are not available for further study. Extensive studies of more than 6000 spionids from a variety of collections in Hawaiian waters have yielded 29 species representing 19 genera (Appendix I). Twenty-eight of the species came from waters around Oahu, while the other species, *Spiophanes bombyx,* was collected from deep water off of Kahalui, Maui, and from anchialine ponds which are shoreline pools without surface connection to the sea and which have waters of measureable salinity and show tidal rhythms (Maciolek and Brock, 1974) on the island of Hawaii. The nitric acid-formalin decalcification method (Brock and Brock, 1977) provides a rapid means of extracting polychaetes, particularly the small boring polydorids, in excellent condition from calcareous substrata. The use of this technique has revealed that spionids are major components previously overlooked (Hartman, 1966; Amerson and Shelton, 1976), of the polychaete fauna of Hawaiian and Johnston Atoll reefs (Ward, 1980, 1981).

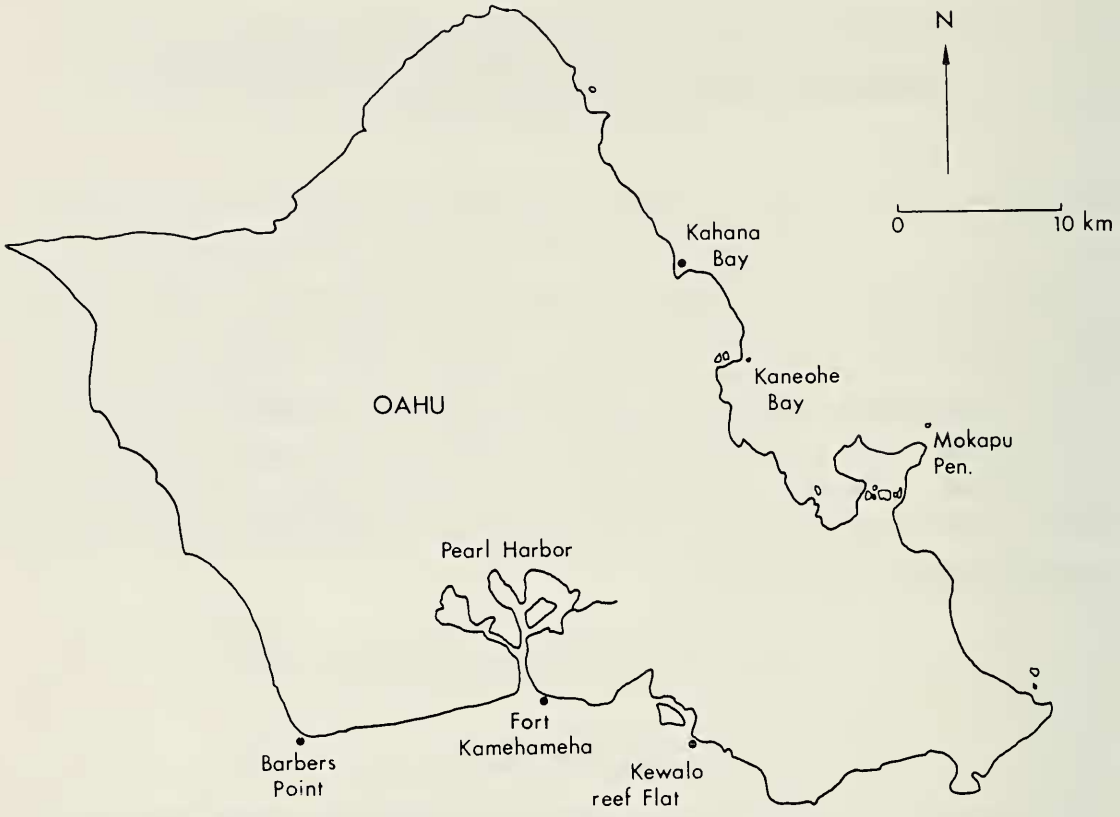

Fig. 1. Oahu, Hawaii showing collecting areas.

Appendix I lists collection data and zoogeographical distribution for the 29 species of spionids from Hawaii.

The holotypes and one set of paratypes are deposited in the Bernice Pauahi Bishop Museum (BPBM), Honolulu, Hawaii. Additional paratypes are deposited in the National Museum of Natual History, Smithsonian Institution (USNM), Washington, D.C. Material is also deposited in the Processing Center, Naval Ocean Systems Center (NOSC), Kailua, Hawaii.

Keys, illustrations, and descriptions of Hawaiian spionids will be given in the *Annelida: Polychaeta* chapter of the revision of *Reef and Shore Fauna of Hawaii* (section 3) presently in preparation through Bishop Museum.

Station Data

Following is the collection information on Oahu for the 5 new species of spionids: *Australospio mokapu, Laonice papillibranchiae, Polydora kaneohe, Polydora pilikia,* and *Pygospio muscularis* (Figs. 1 and 2). Number of specimens are in parentheses.

BARBERS POINT, 21°17′50″N, 157°7′38″W, 1.2 miles W of the Chevron Oil Company pipeline, coll. B. L. Burch, 5.5 m depth, sand, May 1977 *L. papillibranchiae* (1); June 1978 *L. papillibranchiae* (4).

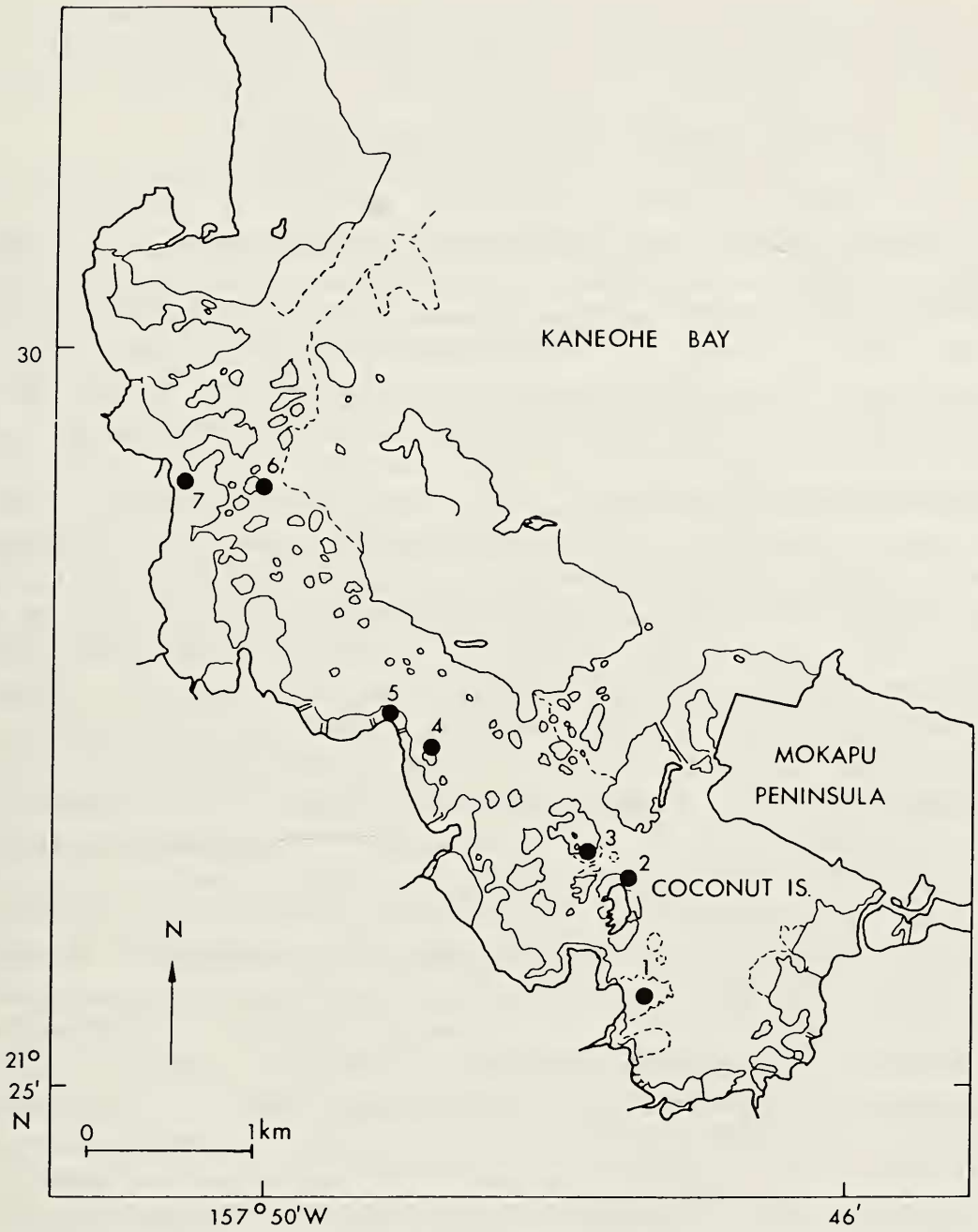

Fig. 2. Kaneohe Bay, Oahu showing collecting sites (map after Banner and Bailey 1970).

PEARL HARBOR, 1. Ford Island power plant, 21°21′42″N, 157°57′42″W, coll. J. G. Grovhoug and W. J. Cooke, 26 Oct. 1978, 6.1 m depth, silt and rubble, NOSC 780036HA sample A *P. pilikia* (2); NOSC 780036HA sample B *P. pilikia* (50). 2. Pearl Harbor power plant #3, 21°20′59″N, 157°58′10″W, coll. J. G. Grovhoug and W. J. Cooke, 26 Oct. 1978, 7.6 m depth, silt and rubble, NOSC 780036HA sample B *P. pilikia* (2).

FORT KAMEHAMEHA, 29°19′55″N, 157°57′18″W, 1. Coll. J. H. Bailey-Brock, Apr. 1978, 125 m from shore, 0.5 m depth, sand and coral rubble *P.*

muscularis (11); 2. Coll. M. B. Wagner, spring 1978, 425 m from shore, 0.5 m depth, sand and coral rubble *P. pilikia* (16), *P. muscularis*. (1).

KEWALO, 21°17′42″N, 157°51′36″W, coll. L. A. Ward, 25 Feb. 1978, 27 m from shore, 0.75 m depth, coral rock *P. muscularis* (3).

MOKAPU PENINSULA, 1. Naval Ocean Systems Center, Ulupau microcosm facility, 21°27′36″N, 157°44′12″W, coll. R. S. Henderson, silt and coral rubble from a 1.4 m², 500 liter tank (see Henderson *et al.*, 1976), NOSC 760004HA Tank U7503-2, 2 March 1976 *A. mokapu* (1); NOSC 760089HA Tank 9, 30 Nov. 1976 *A. mokapu* (1); NOSC 760089HA Tank 11, 1 Dec. 1976 *A. mokapu* (1); NOSC 760089HA Tank 12, 1 Dec. 1976 *A. mokapu* (1). 2. Sweep Pier lagoon, 21°27′21″N, 157°47′01″W, coll. R. S. Henderson, 8 Jan. 1979, 6 m depth, silt, NOSC 790002HA station 1 *A. mokapu* (3).

KANEOHE BAY, 1. Station 1, 21°25′31″N, 157°47′27″W (Fig. 2, station 1), coll. R. E. Brock, 5 Oct. 1976, NOSC 760091HA: sample 3-1-367, lagoon floor, 7.6 m, silt and rubble *P. pilikia* (4); sample 3-7-373, reef slope, 3.6 m, coral rock *P. pilikia* (33); sample 3-11-377, reef crest, 1.2 m, coral rock *P. pilikia* (165); sample 3-17-383, reef flat, 1 m, silt and rubble *P. pilikia* (503). 2. Station 1, 21°25′31″N, 157°47′27″W (Fig. 2, station 1), coll. J. K. F. White, 1 m, boring in coral settlement blocks, Dec. 1977, 4 month exposure *P. kaneohe* (1), *P. pilikia* (2); coll. Apr. 1978, 8 month exposure *P. pilikia* (1). 3. Windward reef flat, Coconut Island, 21°26′28″N, 157°47′22″W (Fig. 2, station 2), coll. J. K. F. White, 2 m, boring in coral settlement blocks, Nov. 1977, 3 months exposure *P. pilikia* (2); Dec. 1977, 4 months exposure *P. pilikia* (31). 4. Checker Reef, 21°26′31″N, 157°47′41″W (Fig. 2, station 3), coll. L. C. Hubbell, 23 Apr. 1976, 3 m, sand, NOSC 760069HA *P. kaneohe* (2); coll. J. K. F. White, Nov. 1977, 2 m, boring in coral settlement block, 3 months exposure *P. pilikia* (3). 5. Station 4, 21°27′14″N, 157°48′46″W (Fig. 2, station 4), coll. J. G. Grovhoug and R. S. Henderson, 27 Feb. 1975, 3 m, silt covering coral rubble, NOSC 750001HA (Sta. KBBS 28) *P. pilikia* (1). 6. Station 5, 21°27′34″N, 157°49′07″W (Fig. 2, station 5), coll. R. E. Brock, 6 Oct. 1976, NOSC 760091HA, sample 2-5-398, reef slope, 9 m, coral rock *L. papillibranchiae* (2), *P. pilikia* (12); sample 2-8-401, reef crest, 1 m, coral rock, *P. pilikia* (13); sample 2-24-417, reef flat, 0.76 m, coral rock, *P. pilikia* (18). 7. Station 6, 21°29′05″N, 157°50′06″W (Fig. 2, station 6), coll. R. E. Brock, 12 Oct. 1976, NOSC 760091HA, sample 1A-4-479, lagoon floor, 9 m, silt and rubble *P. pilikia* (12), *L. papillibranchiae* (1); sample 1A-7-483, reef crest, 1 m, coral rock *Polydora pilikia* (2). 8. Station 7, 21°29′11″N, 157°50′33″W (Fig. 2, station 7), coll. R. E. Brock, 7 Oct. 1976, NOSC 760091HA, sample 1-8-449, reef slope, 2.4 m, coral rock *P. pilikia* (43); sample 1-11-452, reef crest, 1 m, coral rock *P. pilikia* (2); sample 1-24-465, reef flat, 1 m, coral rock *P. pilikia* (11).

KAHANA BAY, 21°33′36″N, 157°52′33W, 1. Coll. L. A. Ward, 16 May

1980, 10 m from shore, 1 m, shifting sand *P. muscularis* (11); 2. Coll. M. B. Wagner, spring 1978, 15 m from shore, 1 m, shifting sand *P. muscularis* (250).

Australospio mokapu, new species
Fig. 3

Material examined.—Mokapu Peninsula, Oahu, Hawaii: Experimental tanks at NOSC Ulupau microcosm facility, silt and coral rubble—holotype (BPBM R640), paratype (R641) and 2 paratypes (USNM 64344, 64656). Sweep Pier lagoon, 6 m, silt—3 specimens.

Description.—All 7 specimens are anterior fragments. The largest fragment, the holotype, is 20 mm long and 2.3 mm wide for 64 setigers. The body is pinkish-brown in alcohol without any distinct color pattern.

Prostomium anteriorly trilobed, tapering as caruncle nearly to posterior margin of setiger 1 (Fig. 3a). 1–3 pairs of small, circular eyes present; occipital tentacle absent; tentacular palps missing from all 7 specimens. Peristomium raised, forming small lateral wings, extending as low ridge around caruncle (Fig. 3a).

Setiger 1 reduced in size, with capillary notosetae and neurosetae. Notopodia with 2 tiers of winged capillaries on setigers 1–5; 4 tiers of heavy, granular, winged capillaries on setigers 6–9; and 2 tiers of thin, winged capillaries from setiger 10 to end of fragment. Neuropodia with 2 tiers of winged capillaries on setigers 1–5; 4 tiers of heavy, granular, winged capillaries and geniculate setae with fine hairs (Fig. 3b) on setigers 6–9; 2 tiers of winged capillaries from setiger 10 accompanied by 2 to 3 granular sabre setae from setiger 15 and bidentate hooded hooks (Fig. 3c) from setiger 25. Tridentate neuropodial hooded hooks (Fig. 3d) occurring on some posterior setigers in some specimens including holotype.

Cirriform branchiae starting on setiger 1 and continuing to end of fragment. In anterior setigers branchiae attached basally to notopodial lamellae and in posterior setigers connected by easily detachable thin membrane with notopodial lamellae.

Notopodial lamellae short and rounded on setigers 1–3 (Fig. 3e), broader and leaf-like from setiger 4, increasing in size towards posterior end of fragment (Fig. 3f). Neuropodial lamellae small and subtriangular on setigers 1–3 (Fig. 3e), becoming larger and broader from setiger 4, dividing into 4 lateral lobes from setiger 14 (10–13 in paratypes) (Fig. 3f), then produced into 4 papillar-shaped projections (Fig. 3g) from setiger 16–23 in holotype (but not present in paratypes). Neuropodial lamellae single, elongate lobes in posterior setigers (Fig. 3h). Shape of pygidium unknown.

Remarks.—*Australospio mokapu* differs from the closely related Australian species *A. trifida* Blake and Kudenov, 1978, by the shape of the notopodial lamellae, the presence of a thin, delicate membrane connecting

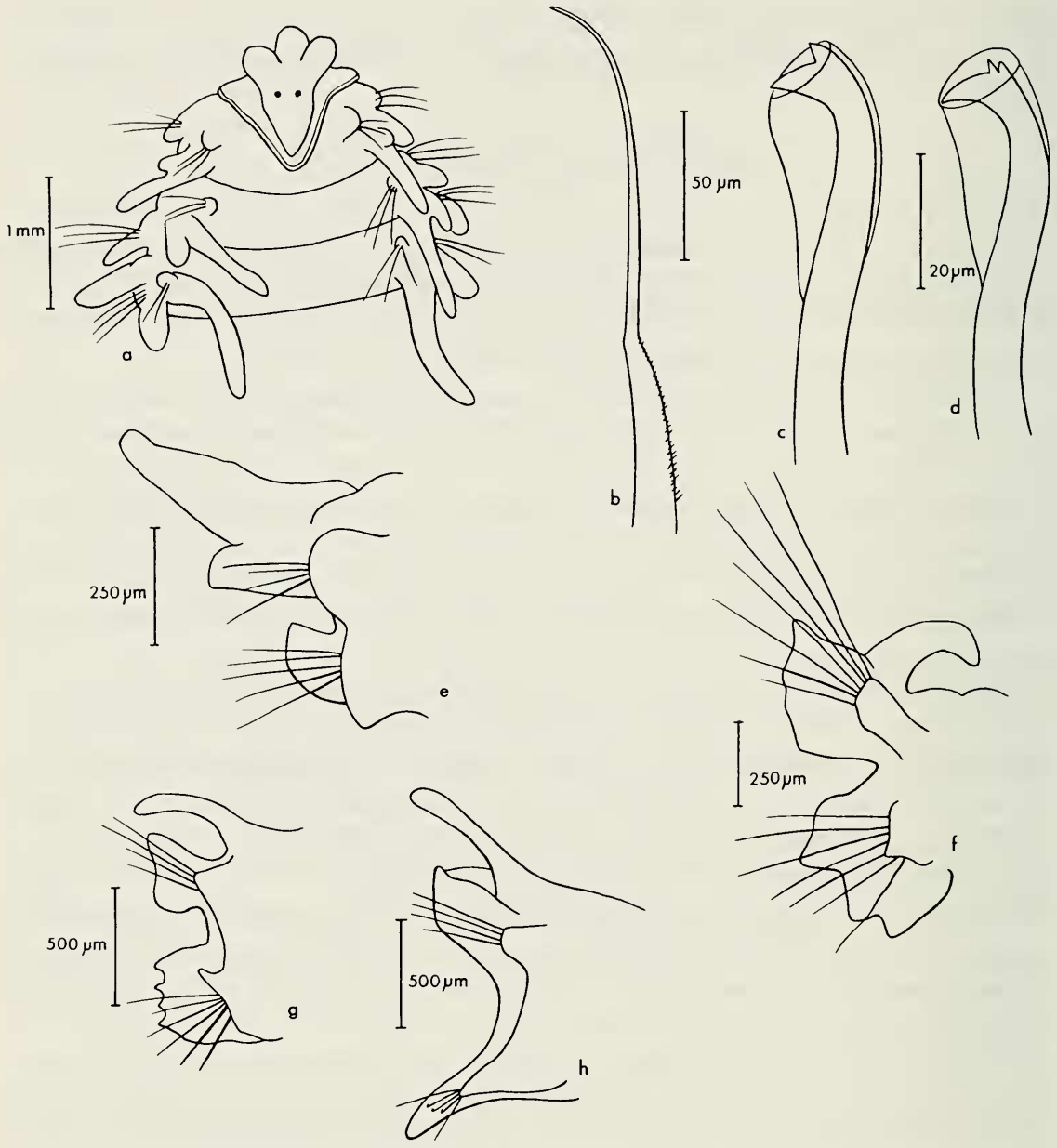

Fig. 3. *Australospio mokapu* (holotype): a, Anterior end, dorsal view; b, Geniculate seta; c, Bidentate neuropodial hooded hook; d, Tridentate neuropodial hooded hook; e, Anterior setiger, frontal view; f, Setiger 14, frontal view; g, Setiger 16, frontal view; h, Posterior setiger, frontal view.

posterior branchiae and notopodial lamellae, neuropodial hooded hooks first occurring on setiger 25 and the occurence of tridentate hooded hooks on some setigers as well as the holotype having neuropodial lamellae with 4 papillar-shaped lobes. This last character may be an artifact of preservation or due to the worm being ovigerous.

Etymology.—This species is named for the type-locality, Mokapu Peninsula, Oahu.

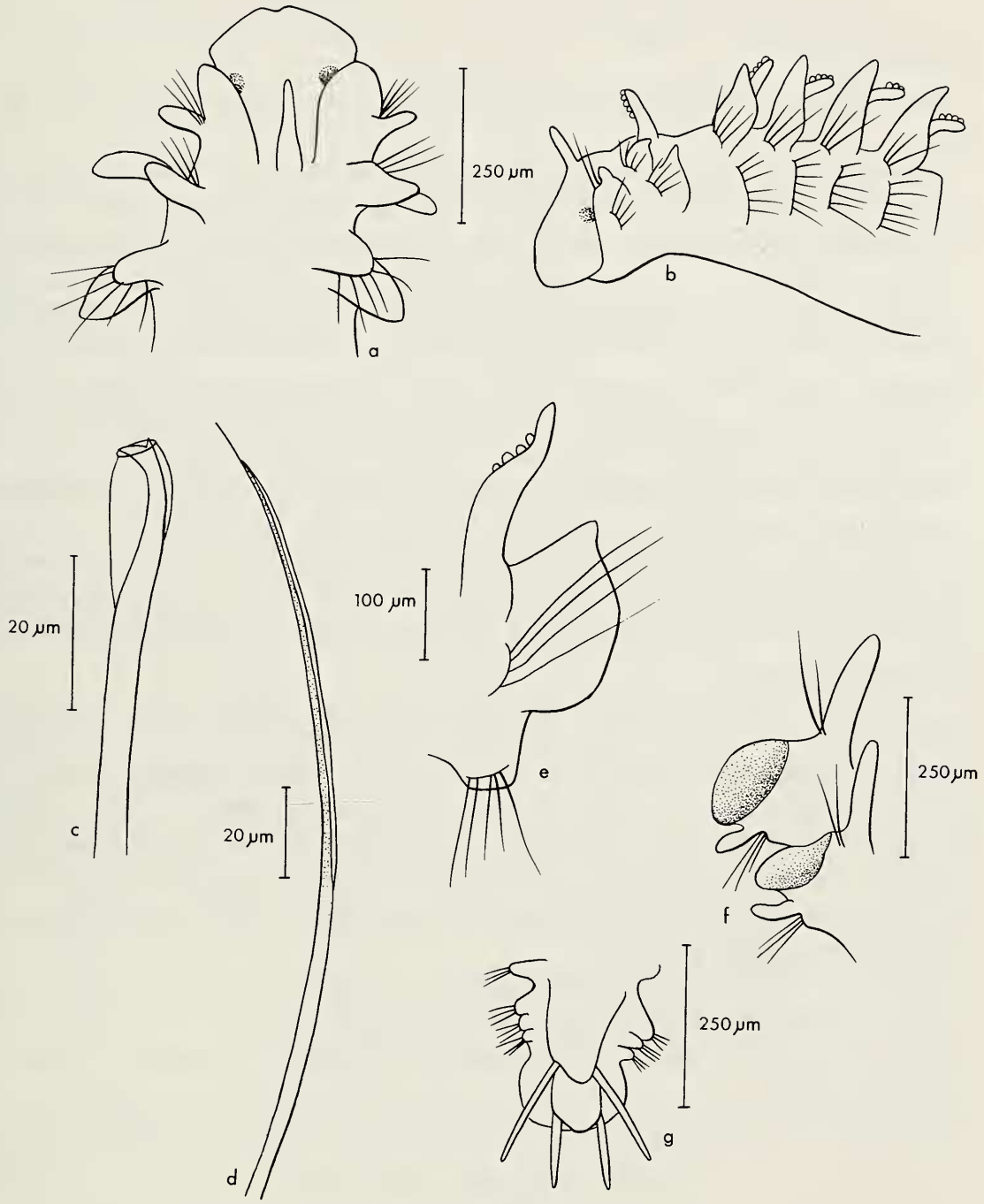

Fig. 4. *Laonice papillibranchiae* (holotype): a, Anterior end, dorsal view; b, Anterior end, lateral view; c, Bidentate neuropodial hooded hook; d, Sabre neuroseta; e, Anterior setiger, frontal view; f, Two posterior setigers showing lateral interramal pouches (stippled area): g, Pygidium, dorsal view.

Laonice papillibranchiae, new species
Fig. 4

Material examined.—Oahu, Hawaii: Barbers Point, sand, 5.5 m—5 specimens, holotype (BPBM R642). Kaneohe Bay, reef slope on coral rock, 9

m; silt and rubble on lagoon floor, 9 m—3 specimens, 2 paratypes (USNM 64345).

Description.—The holotype is 12 mm long and 0.4 mm wide for 87 setigers.

Prostomium anteriorly blunt, tapering posteriorly to middle of setiger 1; bearing long, thin occipital tentacle and pair of large, pale eyes (Fig. 4a, b). Peristomium inconspicuous, tentacular palps missing from all 8 specimens.

Setiger 1 reduced in size, bearing capillary notosetae and neurosetae. All notosetae and anterior neurosetae consisting of 2 tiers of limbate capillaries without granulations; anterior tier of capillaries shorter than posterior tier. Bidentate neuropodial hooded hooks (Fig. 4c) beginning on setigers 16 to 19 and continuing posteriorly along with several alimbate capillaries. Two granular sabre neurosetae (Fig. 4d) present, starting on setigers 9 or 12.

Branchiae free of notopodial lamellae, starting on setiger 2; branchiae absent from posterior third of body. First pair small and digitiform, becoming longer from setiger 3 and reaching full-size on setiger 6. Branchiae with pinnules or papillae on one side giving them appearance similar to pinnate branchiae of *Prionospio* (Fig. 4e). Low dorsal ridges extending across dorsum from setiger 17.

Notopodial lamellae small, digitiform on setiger 1 (Fig. 4b), becoming foliose and larger from setiger 2 (Fig. 4e), decreasing in size in posterior setigers. Neuropodial lamellae smaller than notopodial lamellae, subtriangular on setigers 1 and 2 (Fig. 4b), becoming subquadrate thereafter (Fig. 4e). Lateral interramal pouches (Fig. 4f) present between neuropodial lamellae of setigers 12 and 13, continuing to within few setigers of end of body. Pygidium (Fig. 4g) consisting of 3 large lobes with 4 long, thin dorsolateral cirri, easily lost.

Remarks.—The presence of pinnules or papillae on the branchiae of *Laonice papillibranchiae* is unique for this genus.

Etymology.—This species is named for the pinnules or papillae that occur on the branchiae.

Polydora kaneohe, new species
Fig. 5

Material examined.—Kaneohe Bay, Oahu, Hawaii: Checker Reef, sand, 3 m—holotype (BPBM R643) and paratype (BPBM R644); boring in coral settlement block, 1 m—paratype (USNM 64346).

Description.—The holotype, a complete specimen, is 9 mm long and 0.8 mm wide for 61 setigers, while the longest anterior fragment is 8.7 mm long and 0.8 mm wide for 48 setigers.

Prostomium anteriorly incised, tapering as caruncle to posterior margin of setigers 2 or 3 (Fig. 5a). Two pairs of eyes and small occipital tentacle

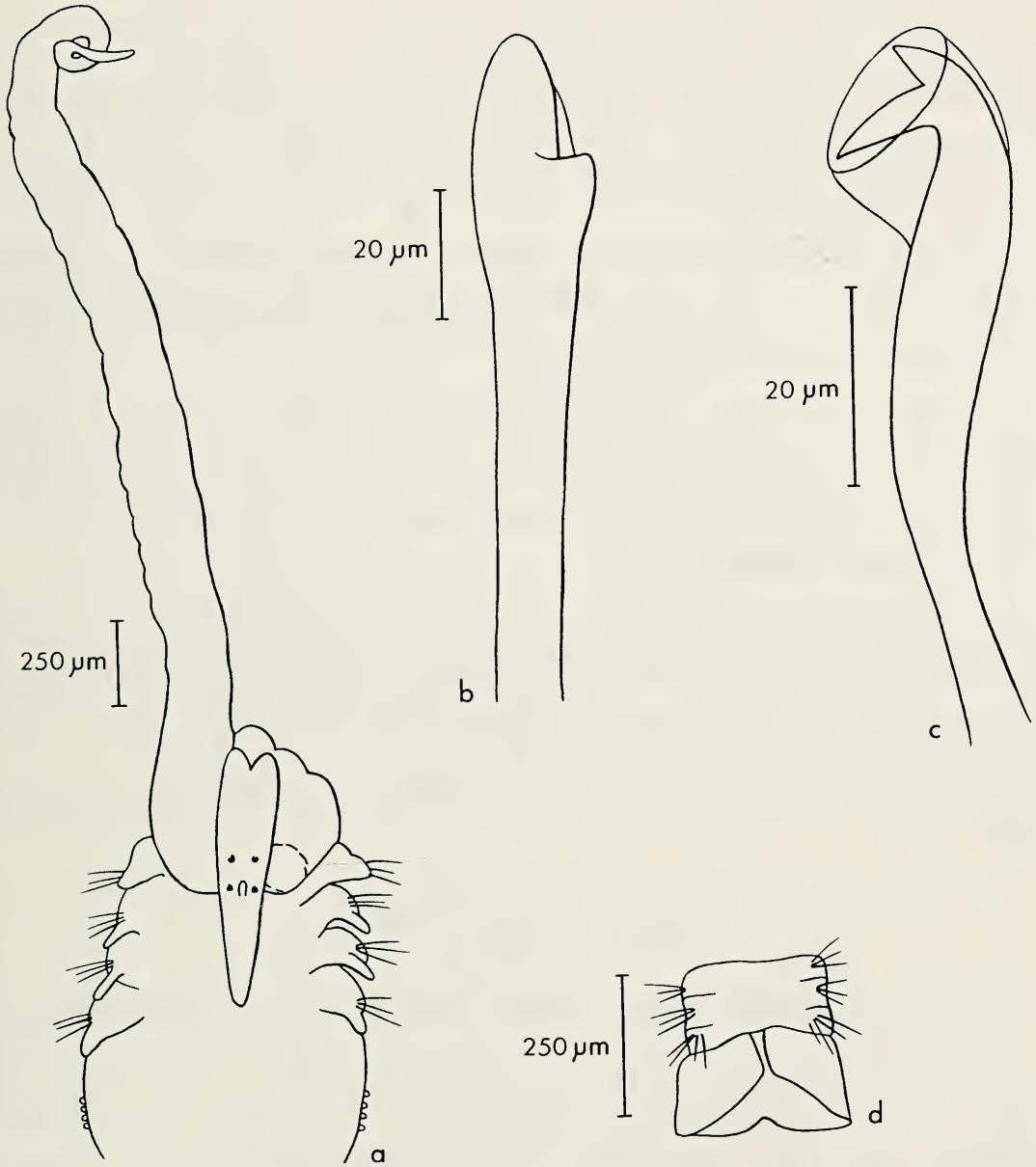

Fig. 5. *Polydora kaneohe* (holotype, a–c; paratype BPBM R644, d) a, Anterior end, dorsal view; b, Modified spine of setiger 5; c, Bidentate neuropodial hooded hook; d, Pygidium, dorsal view.

present (Fig. 5a). Peristomium extending beyond prostomium ventrally, bearing pair of curled tentacular palps in the holotype but extending to setigers 9 to 15 in paratypes.

Setiger 1 reduced in size, lacking notopodial lobes and notosetae; neurosetae winged capillaries. Setigers 2, 3 and 4 with winged capillaries in both rami. Setiger 5 with dorsal and ventral fascicles of winged capillaries and curved row of heavy, modified spines alternating with pennoned setae. Spines simple, falcate, with broad shelf forming subdistal concavity (Fig. 5b).

Bidentate neuropodial hooded hooks with closely applied apical tooth and constriction of shaft (Fig. 5c) starting on setiger 7 (setiger 6 in paratype USNM 64346), continuing to end of body without accompanying capillaries. Five neuropodial hooks per fascicle in first few setigers, increasing to 7 or 8 per fascicle in following setigers. Posterior notosetae including capillaries and short acicular spines.

Strap-like branchiae starting on setiger 7, reaching full-size on setiger 10 and continuing to within few setigers of pygidium. Pygidium missing in holotype and damaged in paratypes, cup-shaped with dorsal notch and piece missing from ventral section (Fig. 5d).

Remarks.—The major spines of setiger 5 of *Polydora kaneohe* are most similar to those of *Polydora alloporis* Light, 1970, and *P. narica* Light, 1969, in having a broad shelf with a concavity. *Polydora kaneohe* differs from these 2 species in having an occipital tentacle and short acicular spines in the posterior notopodia.

This species was found within a coral settlement block which was decalcified. Whether the worm was occupying a previously formed burrow within the block, or is capable of boring is not known. Other species of this genus are known to bore in calcareous materials (Blake and Evans, 1973), so it is possible that this species is a bioeroder.

Etymology.—This species is named for the type-locality, Kaneohe Bay, Oahu.

Polydora pilikia, new species
Fig. 6

Material examined.—Oahu, Hawaii: Pearl Harbor, silt and rubble—54 specimens. Fort Kamehameha, sand with coral rubble, 0.5 m—16 specimens. Kaneohe Bay: lagoon floor, silt with coral rubble—16 specimens; reef slope, coral rock—88 specimens; reef slope, silt covering coral rubble—1 specimen; reef crest, coral rock—182 specimens; reef flat, coral rock—29 specimens; reef flat, silt and coral rubble—503 specimens; coral settlement blocks—39 specimens, holotype (BPBM R645), 5 paratypes (BPBM R646), 5 paratypes (USNM 64347).

Description.—The holotype, a complete specimen, is 8.7 mm long and 0.48 mm wide for 70 setigers.

Prostomium anteriorly incised with caruncle extending to anterior margin of setiger 5 (Fig. 6A). Eyes absent or up to 3 circular pairs, sometimes fused together; occipital tentacle absent. Peristomium inconspicuous, with tentacular palps extending back to setiger 17.

Setigers 1–4 and 6 with capillary setae in both rami. Setiger 5 bearing dorsal fascicle of geniculate setae, ventral fascicle of winged capillaries and curved row of heavy, modified spines alternating with pennoned setae.

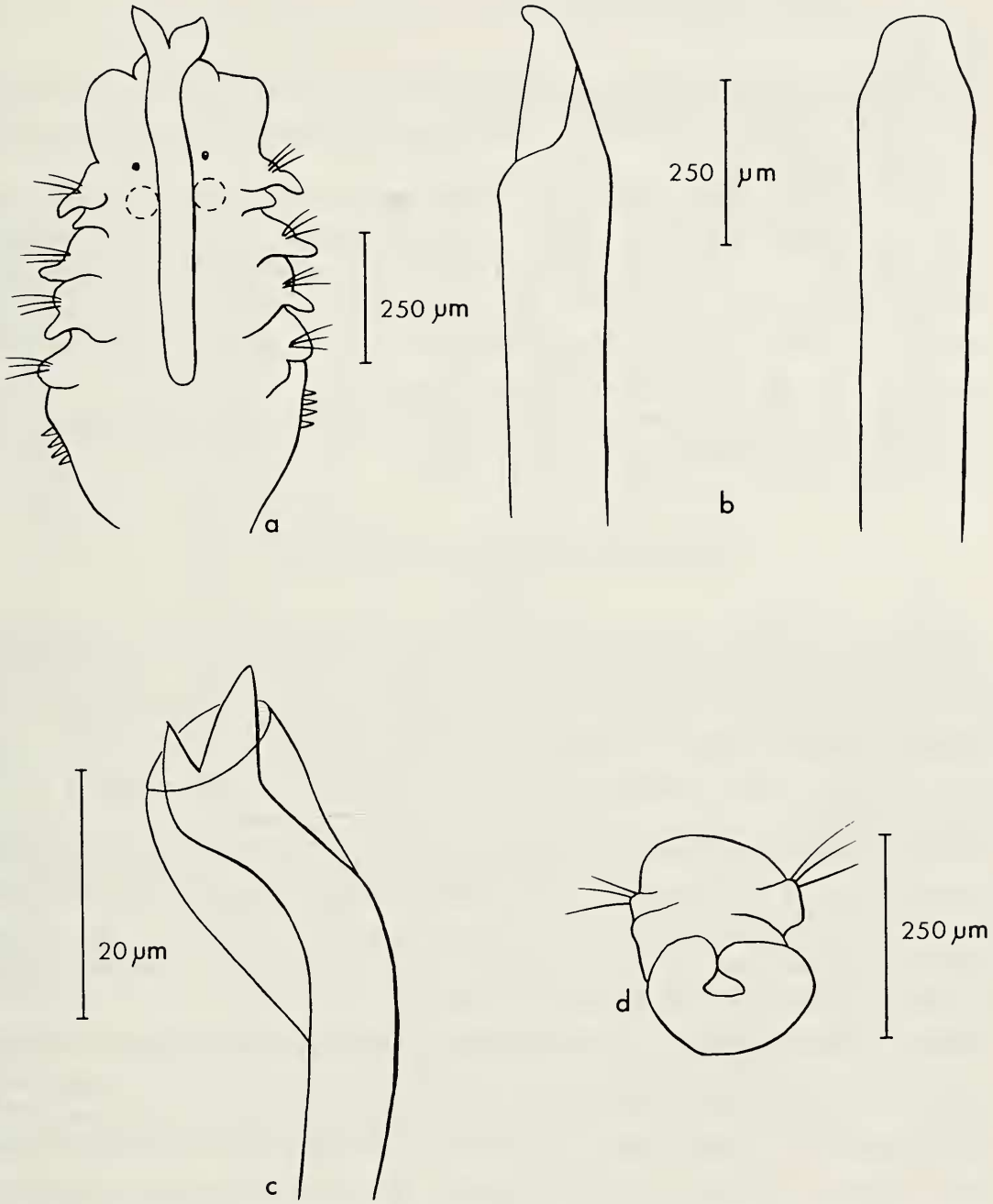

Fig. 6. *Polydora pilikia* (holotype): a, Anterior end, dorsal view; b, Modified spines of setiger 5, two views; c, Bidentate neuropodial hooded hook; d, Pygidium, dorsal view.

Spines varying in shape depending on viewing angle and amount of wear of apex. Spines simple, falcate with subterminal protuberance, and shelf forming concavity and extending as lateral flange (Fig. 6b); apical end of spine pointed or blunt.

Bidentate neuropodial hooded hooks (Fig. 6c) lacking constriction of shaft, starting on setiger 7 and continuing to end of body, accompanied by

several capillaries. Posterior notosetae including capillaries and short acicular spines.

Strap-like branchiae beginning on setiger 8 or 9, but lacking from posterior third of body. Pygidium damaged in holotype, cup-shaped with dorsal notch in paratypes (Fig. 6d).

Remarks.—The major spines of the fifth setiger of *Polydora pilikia* are similar to those of *Polydora socialis* (Schmarda, 1861) and *P. concharum* Verrill, 1880, as described by Blake (1971) and *P. giardi* (Mesnil, 1896) but it differs from these 3 species in having acicular spines in the posterior notopodia. It differs from *P. concharum* and *P. socialis* in the shape of the pygidium. This species is a bioeroder of coral rock.

Etymology.—This species is named for the Hawaiian word meaning trouble because of the difficulties in identifying it.

Pygospio muscularis, new species
Fig. 7

Material examined.—Oahu, Hawaii: Fort Kamehameha, sand with coral rubble, 0.5 m—12 specimens. Kewalo reef flat, coral rock—3 specimens. Kahana Bay, shifting sand—261 specimens, holotype (BPBM R647), 10 paratypes (BPBM R648), 10 paratypes (USNM 64348).

Description.—The complete holotype is 3.8 mm long and 0.47 mm wide for 35 setigers.

Prostomium subconical with entire anterior margin tapering as caruncle to posterior margin of setiger 2, with small occipital tentacle between pair of tentacular palps, and 2 pairs of crescent-shaped eyes (Fig. 7b). Peristomium forming collar laterally and ventrally and bearing pair of tentacular palps extending posteriorly to setiger 7 (Fig. 7b).

Setiger 1 reduced in size, uniramous with single neuropodial lobe shifted dorsally; setae short, granular, winged capillaries. Both notopodia and neuropodia of setigers 2–7 with granular, winged capillaries; notosetae of 2 types: numerous, short, stout capillaries in anterior part of fascicle and longer, thinner capillaries in posterior part; all neurosetae short, stout capillaries. Notopodia from setiger 8 up to end of body with long, thin, winged capillaries. Bidentate neuropodial hooded hooks, with closely applied apical tooth, without constricted shaft (Fig. 7c), starting on setiger 8; fascicle bearing 14 hooks continuing to end of body, without accompanying capillaries.

Setiger 8 enlarged, about twice length of adjacent setigers, with muscular appearance due to gizzard-like structure (Fig. 7a) (as in *Polydora socialis* and *Carazziella reishi,* see Blake, 1971, 1979).

Branchiae strap-like, free of notopodial lamellae and occurring on setigers 7–18 (in holotype, 7–20 in paratypes). Notopodial lamellae of setiger 1 small, digitiform, subtriangular on setigers 2–7 (Fig. 7b), and becoming indistinctly

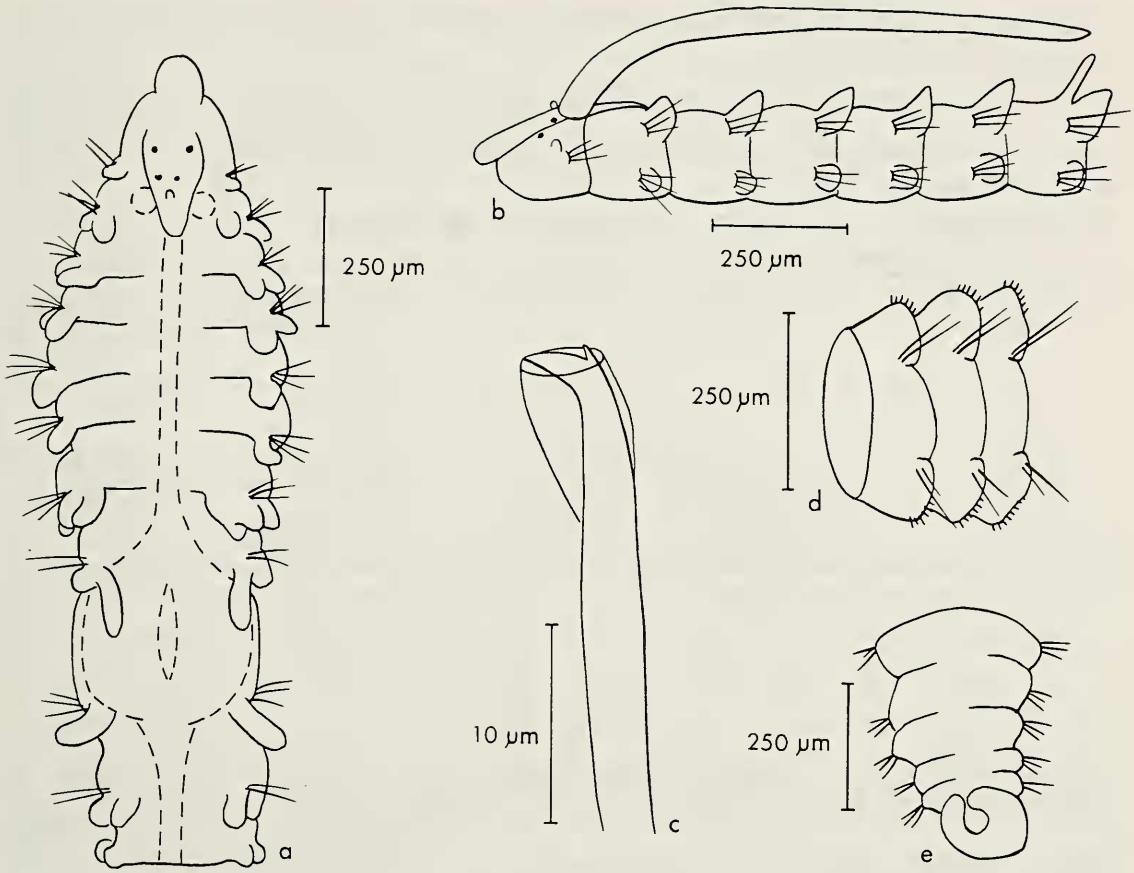

Fig. 7. *Pygospio muscularis* (holotype): a, Anterior end, dorsal view, with gut indicated by broken lines; b, Anterior end, lateral view; c, Bidentate neuropodial hooded hook; d, Posterior setigers, dorsolateral view; e, Pygidium, dorsal view.

digitiform posteriorly (Fig. 7d). Neuropodial lamellae on setigers 2–7 subquadrate and smaller than notopodial lamellae (Fig. 7b), small, rounded close to body wall from setiger 8 to posterior end of body (Fig. 7d). Pygidium cup-shaped with dorsal notch (Fig. 7e), as in polydorids.

Remarks.—Table 1 summarizes the major characteristics and geographical distributions of the species of *Pygospio* and provides a means of comparing the 4 species.

Feeding.—Observations on live worms helped to elucidate the feeding methods of this species. As is typical of the family, these worms are surface-deposit feeders which pick up sand grains and detritus from the surrounding area with their tentacular palps (Fauchald and Jumars, 1979); they can also pick up particles from the water column with their tentacular palps. The grinding action of the gizzard-like structure, visible through the thin body wall, probably serves to abrade the bacterial/algal film covering the sand grains, which is then digested.

Etymology.—*Pygospio muscularis* is named for the heavy, muscularized eighth setiger.

Table 1.—A summary of the major morphological characteristics and geographical distribution of species of *Psygospio*.

	P. californica Hartman, 1936	*P. dubia* Monro, 1930	*P. elegans* Claparède, 1863*	*P. muscularis* n. sp.
A. Characteristic				
Prostomium	round	incised	incised	round
Occipital tentacle	absent	present	absent	present
Setigers with branchiae	19 to last ¼ of body	2, 3, 7–13	11–13 to end of body (males also on 2)	7–18 or 20
Start of hooded hooks	setigers 23	setigers 17–20	setigers 8–9	setiger 8
Setiger 8	not enlarged	not enlarged	not enlarged	enlarged
Pygidium	4 lobes	variable	4 lobes	cup-shaped
B. Distribution	California	Falkland Is.	Cosmopolitan	Hawaii

* As described by Foster, 1971.

Discussion

Recent studies of spionid polychaetes from Hawaii have yielded 29 species representing 19 genera (Appendix I). Five of these species, belonging to 4 genera, are new to science and are described in this paper. Of the 29 species, 9 are cosmopolitan; 2 possibly have cosmopolitan distributions; 6 have been recorded from Indian and/or Pacific Ocean locations; 5 are new species endemic to Hawaii; and 7 have an indeterminable range since the species have not been identified (Appendix I).

Fauchald (1976) stated that more research was needed on tropical polychaetes and that previous sampling techniques were unsuitable for obtaining the smaller polychaetes in the tropics. Kohn and Lloyd (1973a, b), Kohn and White (1977) and Hutchings (1974) have extracted polychaetes from coral rock by carefully clipping the material away, a method that is likely to damage spionids and other small polychaetes. Spionids were not found to be numerically important constituents of the polychaete faunas in these studies. As previously mentioned, use of the nitric acid-formalin dissolution method of Brock and Brock (1977) recently has shown that spionids are conspicuous components of the reefs of Hawaii and Johnston Atoll, where they form up to 50 and 75%, respectively, of the polychaete faunas (Ward, 1980). The low number of spionid species reported from Indonesia by Kohn and Lloyd (1973a), the Philippines by Pillai (1965), Palau by Takahasi (1941), Guam by Kohn and White (1977), and the Marshall Islands by Woodwick (1964) versus the large number of species reported from Japan by Okuda (1937) and Imajima and Hartman (1964), southeastern Australia by Blake and Kudenov (1978), and Day and Hutchings (1979), Hawaii by Ward (1981)

and California by Hartman (1969) is certainly a reflection of the intensity of sampling, collecting techniques used, and type of substrata investigated, rather than a difference in tropical versus nontropical locations. This can be seen in the large numbers of species recorded from Hawaii (Ward, 1981, and in prep.) which is an area that has been under investigation for some years. As the nitric acid-formalin dissolution method is used more on samples collected from tropical and subtropical regions, one can expect the spionids to be recognized as a numerically important and diverse family of polychaetes.

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Appendix I

The relative depths, types of substrata and habitats from which the 29 species of Hawaiian Spionidae have been reported.

Species	Depth Substratum								Habitat								Distribution					
	Shallow (up to 40 m)	Deep (about 400 m)	Coral rock	Mixed (coral rock, sediment)	Mud	Oyster shells	Sand	Silt	Anchialine ponds	Canal/Stream	Channel bottoms	Lagoon floor	Microcosm tanks	Oyster mariculture tanks	Reef crest	Reef flat	Reef slope	Cosmopolitan	Possibly Cosmopolitan	Indian and/or Pacific Ocean	Hawaiian	Indeterminable
Aonides oxycephala	√							√					√					√				
Australospio mokapu	√			√				√				√	√								√	
Boccardiella sp.	√		√												√							√
Carazziella reishi	√		√												√	√	√			√		
Dispio uncinata	√						√					√						√				
Laonice papillibranchiae	√		√	√			√					√					√				√	
Malacoceros sp.	√				√					√												√
Microspio granulata	√		√	√			√					√	√			√				√		
Minuspio sp.	√			√	√			√				√	√			√						√
Polydora armata	√		√	√			√	√				√	√		√	√	√	√				
Polydora kaneohe	√		√	√												√					√	
Polydora pilikia	√		√	√								√			√	√	√				√	
Polydora tridenticulata	√		√	√								√			√	√	√			√		
Polydora websteri	√		√		√	√				√				√	√		√	√				
Prionospio sp.	√		√	√	√		√	√				√	√			√	√					√
Pseudopolydora antennata	√		√	√						√			√			√		√				
Pseudopolydora corallicola	√		√	√				√					√			√				√		
Pseudopolydora sp.	√		√			√				√				√		√						√
Pygospio muscularis	√		√	√			√					√				√					√	
Rhynchospio sp.	√			√												√						√
Scolelepis squamata	√			√									√					√				
Scolelepis sp.	√							√					√									√
Spio filicornis	√		√	√			√	√				√	√		√	√		√				
Spio pettiboneae	√			√									√						√			
Spiophanes berkeleyorum		√					√	√			√									√		
Spiophanes bombyx	√	√			√		√		√		√							√				
Spiophanes wigleyi		√			√		√				√								√			
Streblospio benedicti	√				√					√								√				
Tripolydora spinosa	√		√												√	√				√		